<T>International Environmental Governance and the Final Frontier: The Protection of Vulnerable Marine Ecosystems in Deep-Sea Areas beyond National Jurisdiction

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<H1>I. INTRODUCTION

The ecological health of the global oceans, and their continued ability to withstand a pervasive and ever-increasing array of anthropogenic pressures, represents an enduring cause for scientific and regulatory concern. In recent years, concerted international attention has been focused towards promoting the conservation and sustainable use of marine biological diversity located in areas beyond national jurisdiction (ABNJ). Most tangibly, in 2015, the United Nations General Assembly (UNGA) adopted a resolution[1] confirming an intention to develop an internationally legally binding instrument (ILBI) under the framework of the 1982 UN Convention on the Law of the Sea (UNCLOS)[2] to advance the regulation of ABNJ.[3] This was preceded by an extensive series of meetings convened between 2006 and 2015 by the Ad Hoc Open-Ended Informal Group to study issues related to the conservation and sustainable management of marine biological diversity beyond areas of national jurisdiction (BBNJ), which was established under an earlier UNGA resolution[4] and which identified four key themes to be addressed through the ILBI. Respectively, these themes encompass marine genetic resources; area-based management tools; environmental impact assessments; and capacity building and the transfer of marine technology,[5] which were all considered to have been under-regulated within UNCLOS. Pursuant to Resolution 69/212, a Preparatory Committee held four meetings between 2016 and 2017 to identify points of convergence and

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[1] UNGA Resolution 69/292 (6 July 2015), para 1.

[2] United Nations Convention on the Law of the Sea, 1982, 1883 UNTS 396 (UNCLOS).

[3] The term 'areas beyond national jurisdiction (ABNJ) is not defined in either UNCLOS or Resolution 69/212, *supra* note 1. Instead, these areas are residual constructs within UNCLOS, denoting the high seas (art 86) and the 'Area' (art 1(1)).

[4] UNGA Resolution 59/24 (17 September 2004). The reports from the Ad Hoc Open-Ended Informal Group to study issues related to the conservation and sustainable management of marine biological diversity beyond areas of national jurisdiction are available at <http://www.un.org/Depts/los/biodiversityworkinggroup/biodiversityworkinggroup.htm>.

[5] UNGA Resolution 69/292, *supra* note 1, para 2.

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divergence between the participants[6] and to facilitate the elaboration of the ILBI when negotiations commence in earnest in 2018.[7] Assuming satisfactory progress, the ILBI is intended to be concluded in 2020 as the third formal implementing agreement to UNCLOS.[8]

The elaboration of a new regulatory stratum for ABNJ is a welcome development, for such waters have habitually proved challenging from the standpoint of international environmental governance (IEG). ABNJ remain among the least regulated—and, thereby, the most ecologically vulnerable—locations on the planet. Indeed, the prevailing regulatory philosophy for the high seas has long been one of a broad and perpetual entitlement to communal usage, limited only by the nebulous obligation to demonstrate 'due regard' to the rights of other states when exercising traditional nautical freedoms.[9] This has done little to deter a frontier mentality towards high seas resources in many quarters. Significant governance gaps have also been exposed with respect to ABNJ. While UNCLOS provides a broad regulatory framework for maritime conduct in ABNJ, this has not fully addressed particular activities undertaken in these areas. Even where governance structures have been established, they have not always been endowed with a mandate to regulate the full range of activities pursued. The exploitation of resources within ABNJ has therefore often proceeded in an under-regulated fashion. Moreover, to date, there has been a marked over-reliance upon sectoral regulation, which, while addressing individual matters of pressing concern, has often proved to be insufficiently nuanced to effectively protect and manage biodiversity within ABNJ. Compounding these structural challenges, the remoteness of these locations frequently militates against the effective enforcement of supervisory standards. Against this multi-faceted regulatory backdrop, the nascent ILBI must facilitate a more effective degree of governance for these areas, yet, in the rather stilted vernacular of the process, it should 'not undermine' the work of the numerous pre-existing regimes and sectoral initiatives operating within ABNJ.[10]

The governance challenges incumbent in protecting marine biodiversity in ABNJ are vividly illustrated in the specific context of the deep-sea environment, which is the focus of

[6] Reports available at <http://www.un.org/depts/los/biodiversity/prepcom.htm>.
[7] UNGA Resolution 72/249 (24 December 2017), para 3.
[8] Thereby joining the Agreement Relating to the Implementation of Part XI of UNCLOS of 10 December 1982, 1994, 1836 UNTS 42, and the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, 1995, 2167 UNTS 88 (UNFSA).
[9] UNCLOS, *supra* note 2, art 87(2). The International Seabed Authority (ISA) provides an additional layer of governance for the Area, although its mandate is restricted to oversight of the resources of this part of the seabed, which are to be administered for the benefit of humankind.
[10] UNGA Resolution 69/292, *supra* note 1, para 3.

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this article. For centuries, their sheer inaccessibility has inured these areas against anthropogenic excesses, preserving by default a fragile, yet essentially untouched and surprisingly dynamic and productive, series of ecosystems. In recent decades, however, a rapacious combination of technological innovation and commercial necessity has led to a dramatically increased footprint of human activities in even the deepest parts of the sea. This has inflicted significant damage upon vulnerable deep-water ecosystems in ABNJ, primarily due to poorly regulated fishing activities. Since the 1960s, fisheries have steadily progressed into offshore areas and deeper waters, as shallow water stocks have become increasingly depleted and fishers have been forced to pursue alternative opportunities.[11] Acute regulatory tensions have subsequently arisen over the continued proliferation of bottom fisheries—widely understood to be any fishery that uses gear 'that either contact or are likely to contact the sea floor during the course of the fishing operation'[12]—into ABNJ and at unprecedented depths, notwithstanding considerable scientific uncertainty over the impacts of such activities.

The expansion of these practices continued largely unchecked until the late twentieth century, when opposition began to mobilize against the use of an array of destructive fishing gear in ABNJ. By the late 1990s, bottom fisheries, especially those using heavy trawl nets dragged along the seabed itself or across seamounts and other fragile benthic features known to entice sizeable aggregations of fish, had attracted international notoriety. As concerns mounted over the projected long-term unsustainability of deep-sea fishing upon the target stocks, and the damage inflicted upon delicate marine ecosystems in the process, the management of bottom fisheries in ABNJ became a global regulatory priority. In the process, the development of standards for bottom fisheries has exposed wider governance challenges facing deep-water ecosystems in ABNJ as well as the complications inherent in blending specific sectoral oversight with more generalized regulatory regimes for the marine environment as envisaged by the nascent ILBI.

The management of deep-sea ecosystems is thus an illuminating example of the past, present, and future difficulties facing IEG in ABNJ. Until the present century, many deep-sea bottom fisheries were subject to minimal oversight, with such activities falling outside the purview of major regulatory structures and instruments. Indeed, regional fisheries management organizations (RFMOs)—the traditional multilateral vehicle for fisheries

[11] T Morato et al, 'Fishing Down the Deep' (2006) 7 Fish and Fisheries 24 at 31.
[12] A Bensch et al, *Worldwide Review of Bottom Fisheries in the High Seas* (2009) at 2.

governance—had either lacked an explicit remit for the management of these stocks or were only relatively recently established with respect to significant portions of the high seas, while little provision for these particular species and ecosystems had been made under UNCLOS. These lacunae meant that certain stocks could become rapidly depleted and deep-sea ecosystems irrevocably damaged before meaningful regulation could be applied to such fisheries. However, global concerns over the highly destructive nature of bottom fishing have crystallized through the adoption of a series of influential UNGA resolutions, calling on RFMOs and states to adhere to specific commitments for the protection of vulnerable marine ecosystems (VMEs) from the impacts of this type of fishing in the deep-sea environment. The political impetus provided by multiple UNGA resolutions has prompted the adoption of complementary conservation and management measures by particular actors. These measures have also provided a tentative basis for cooperation between regional and sectoral regulators of the type identified through the BBNJ process as a desirable consequence of the prospective ILBI.

As this article will demonstrate, there has been considerable progress towards the elaboration of uniform standards for the protection of VMEs in the deep-sea environment, although deficiencies remain apparent in implementing the current framework. Such shortcomings will need to be further addressed in order to fulfill the commitments established under this cohort of UNGA resolutions and thus protect VMEs from the adverse consequences of deep-sea bottom fisheries in ABNJ. To this end, the second part of this article outlines the threats posed to deep-sea ecosystems by the continued proliferation of bottom fisheries. Thereafter, the third part traces the emergence of regulatory standards towards the protection of VMEs in ABNJ and the development of the pertinent UNGA commitments. The fourth part evaluates the progress achieved towards implementing commitments, with particular reference to the identification and regulation of fishing footprints, the operation of area-based management tools, and the extent to which governance gaps have been closed through the actions of RFMOs as well as individual states and entities. The fifth part then considers the future governance challenges posed by integrating these sectoral approaches within current regimes, while the sixth part advances a series of conclusions as to the future regulatory landscape concerning deep-sea ecosystems in the context of the prospective ILBI.

<H1>II. FISHING AND DEEP-SEA ECOSYSTEMS: TRENDS AND TROUBLES

Bottom fisheries have long posed an under-appreciated threat to the marine environment. Although the popular perception of risks to deep-sea ecosystems is dominated by concerns over the role of extractive marine industries, it nevertheless remains the case that '[f]isheries using bottom trawls are the most widespread source of anthropogenic physical disturbance to global seabed habitats.'[13] The footprint of such fishing varies regionally, but, in particular locations—including those notable for an extensive offshore industrial presence—the ecological impact of bottom trawling has still been found to be greater than the sum of all other anthropogenic activities combined.[14] Bottom fishing is not confined to any one particular geographical area. As a general trend, however, as fishing activities have steadily advanced offshore, there has been a corresponding propensity in recent decades to move into deeper waters.[15] As stocks on the continental shelf have become progressively depleted, demersal fisheries (those targeting fish whose core habitats comprise the seabed or areas in very close proximity to it) have increasingly targeted the upper and mid-sections of the continental slope.[16] Consequently, the mean depth of global fisheries has expanded fourfold since the mid-1960s, accompanied by a steady creep of fishing effort into ABNJ.[17]

A definitive accounting of the ecological impact of bottom fisheries remains elusive. As Michel Kaiser and colleagues observe, '[t]he effects of different fishing gears on the seabed vary considerably amongst gear types and according to the environmental context in which they are fished.'[18] As a general rule, however, gear that is actively dragged along the seabed presents a considerably greater risk to benthic ecosystems than that which is statically fixed or temporarily placed in a particular location. Indeed, certain equipment, such as traps and pots, will ultimately exert a superficial long-term impact upon the marine environment.[19] Others, such as bottom-set gillnets, which are anchored to the seabed and drift with the ocean tide, may inflict little damage to the benthos itself yet attract different concerns over their scope for incidental catches of non-target species, notably marine mammals. Likewise, bottom long-lines are more typically deployed in close proximity to the seabed, yet are

[13] JG Hiddink et al, 'Global Analysis of Depletion and Recovery of Seabed Biota after Bottom Trawling Disturbance' (2017) 114 PNAS 8301 at 8301.
[14] AR Benn et al, 'Human Activities on the Deep Seafloor in the North East Atlantic: An Assessment of Spatial Extent' (2010) 5 PLoS One e12730.
[15] See W Swartz et al, 'The Spatial Expansion and Ecological Footprint of Fisheries (1950 to Present)' (2010) 5 PLoS One e15143.
[16] Morato, *supra* note 11 at 25.
[17] EA Norse et al, 'Sustainability of Deep-Sea Fisheries' (2012) 36 Marine Policy 307 at 308.
[18] MJ Kaiser et al, 'Prioritization of Knowledge-Needs to Achieve Best Practices for Bottom Trawling in Relation to Seabed Habitats' (2016) 17 Fish and Fisheries 637 at 639.
[19] F Stephenson et al, 'Experimental Potting Impacts on Common UK Reef Habitats in Areas of High and Low Fishing Pressure' (2017) 74 ICES Journal of Marine Science 1648 at 1657.

generally considered to be less destructive and intrusive, notwithstanding localized concerns over their excessive presence in particular areas.[20] Ultimately, bottom trawling remains by far the most prevalent type of deep-sea fishing gear. Bottom trawling is an umbrella term for the use of a variety of trawl gear, the common feature of which is that weighted nets are dragged across the seabed, presenting an amplified scope for benthic damage in the process. Accordingly, this form of fishing has attracted arguably the greatest degree of regulatory attention in the context of ABNJ.

Bottom trawling has long been ubiquitous at a variety of depths and jurisdictional zones, ranging from near-shore waters to highly remote locations in ABNJ, and is considered to account for approximately 20–5 percent of all current seafood landings globally.[21] Despite its recent prominence in international fora, scientific and regulatory unease over the adverse impact of large-scale bottom trawling is not a modern phenomenon. Indeed, vivid testimony as to the propensity of the national trawler fleet to 'scour the ground wherever it goes' was presented to a Royal Commission of Enquiry in the United Kingdom as early as 1866,[22] while quantifiable evidence of an ecological threat posed by trawling has been established in the scientific literature since at least the 1930s.[23] More recently, concerns have been raised over the scraping of vulnerable benthic sediments,[24] the gouging of the seabed and damage to fragile submarine features,[25] the removal of habitat-forming species,[26] and the disturbance of complex benthic ecosystems that may in turn further compromise fish productivity.[27] Moreover, while bottom trawling results in specific localized environmental impacts, these fisheries also represent a significant contribution to the cumulative footprint of anthropogenic activities in the global oceans; hence, their effects may be exacerbated in tandem with that of

[20] CK Pham et al, 'Deep-Water Longlining Has Reduced Impact on Vulnerable Marine Ecosystems' (2014) 4387 Scientific Reports 1 at 3.
[21] Hiddink, *supra* note 14 at 8301 (extrapolating global catch data collated by the Food and Agriculture Organization (FAO) since 2009).
[22] RH Thurstan, JP Hawkins and CM Roberts, 'Origins of the Bottom Trawling Controversy in the British Isles: 19th Century Witness Testimonies Reveal Evidence of Early Fishery Declines' (2014) 15 Fish and Fisheries 506 at 515.
[23] M Graham, 'The Trawl Fisheries: A Scientific and National Problem' (1938) 142 Nature 1143.
[24] FG O'Neill and A Ivanović, 'The Physical Impact of Towed Demersal Fishing Gears on Soft Sediments' (2016) 73 (Supplement) ICES Journal of Marine Science 5 at 12.
[25] Indeed, evidence of trawling has remained apparent on the seabed in particular locations, even a number of years after the cessation of all fishing activities. MR Clark et al, 'Effects of Fishing on the Benthic Biodiversity of Seamounts of the "Graveyard" Complex, Northern Chatham Rise' (2010) 46 New Zealand Aquatic Environment and Biodiversity Report 1.
[26] SF Thrush, KE Ellingsen and K Davis, 'Implications of Fisheries Impacts to Seabed Biodiversity and Ecosystem-Based Management' (2016) 73 (Supplement) ICES Journal of Marine Science 44 at 45.
[27] J Collie et al, 'Indirect Effects of Bottom Fishing on the Productivity of Marine Fish' (2017) 18 Fish and Fisheries 619 at 634.

other industries to create further habitat fragmentation within sensitive marine ecosystems.[28] Self-evidently, the environmental risks posed by bottom trawling vary markedly based on the type of habitats affected and the regularity and intensity in which such activities are conducted. Accordingly, as observed below, legal responses to bottom trawling have focused upon identifying areas of particular environmental sensitivity within which fishing is to be largely precluded, alongside mapping the footprint of current fishing activities and restricting trawls to areas of pre-existing intensity and enforcing 'move-on' rules where protected ecosystems may become threatened.

One immediate impediment to the uniform governance of these activities in ABNJ is that, although bottom trawling is widely practised and defined, there is as yet no universal understanding of the concept of the 'deep sea.' An initial review of bottom fishing in ABNJ by the UN Food and Agriculture Organisation (FAO) considered activities conducted at depths of 200 metres or more,[29] a trend that has been followed by the UN Secretary-General in semi-regular reports reviewing the pertinent UNGA commitments, although subsequent FAO documentation has been less consistent.[30] Furthermore, the practical implementation of these commitments has engendered an increasing number of regional and institutional variations. For instance, the North-East Atlantic Fisheries Commission (NEAFC) applies 400 metres as its regulatory threshold,[31] yet, for the same waters, the European Union (EU) has identified instead a series of species that are targeted at advanced depths and has prohibited bottom fishing for these stocks beyond 800 metres.[32] As noted below, the relevant UNGA resolutions have not adopted a formal depth threshold for bottom fisheries. Different regional governance bodies have accordingly applied varying criteria to address the specific needs of the marine ecosystems under their respective purviews.

However it is defined by individual actors, deep-sea bottom fishing nonetheless remains ecologically problematic for two main reasons. First, larger and heavier equipment is required to facilitate effective fishing at advanced depths, so these activities are often far

[28] Thrush, Ellingsen and Davis, *supra* note 26 at 45–6.
[29] Bensch, *supra* note 12 at 2.
[30] FAO documentation now seemingly considers depths of 500 metres to be the appropriate definition. GA Oanta, 'International Organizations and Deep-Sea Fisheries: Current Status and Future Prospects' (2018) 87 Marine Policy 51 at 52.
[31] *Ibid*.
[32] EU Regulation no. 2016/2336 Establishing Specific Conditions for Fishing Deep-Sea Stocks in the North-East Atlantic and Provisions for Fishing in International Waters of the North-East Atlantic and repealing EC Council Regulation no. 2347/2002, [2016] OJ L354/1, arts 3(1), 8(4); see further GA Oanta, 'The European Union's Reform of Deep-Sea Fisheries in the North-East Atlantic' (2017) 32 Intl J Marine & Coastal L 589 at 593–6.

more destructive than other techniques, including trawling undertaken in shallower waters.[33] This is compounded by a tendency for trawls to be conducted intensively in particular locations, notably around seamounts and other fragile submarine features, due to the habitual aggregation of fish in these areas.[34] Moreover, the disturbance of the benthos at advanced depths poses a particularly significant threat to the integrity of deep-sea habitats.[35] Indeed, while warming temperatures, acidification, and changes in ocean circulation have long been identified as the most pressing examples of adverse anthropogenic influence upon the marine environment, it has been advocated in influential quarters that the modification of submarine features by deep-water trawling ought to be considered an equally significant long-term global conservation threat to oceanic ecosystems.[36]

The second key concern relates to the vulnerability of the target stocks themselves. In order to survive at advanced depths in an environment characterized by cold temperatures, little light, and limited productivity, fish typically exhibit delayed sexual maturity, slow growth, and a high maximum age. In marked contrast to fish exploited at shallower depths, deep-water species are acutely vulnerable to the impacts of fishing since, with very few exceptions, such stocks can become rapidly depleted with little scope to regenerate swiftly.[37] The risks of overfishing are compounded by a lack of baseline data concerning both deep-water stocks and their accompanying ecosystems. Consequently , most deep-sea fisheries are considered unlikely to be either ecologically[38] or economically[39] sustainable in the long term. Accordingly, as Telmo Morato and colleagues observe, 'deep-sea fisheries cannot be seen as a replacement for declining shallow-water resources: instead, deep-water habitats should be considered as the new candidates for conservation.'[40]

From a governance standpoint, bottom trawling has raised particular objections when conducted in ABNJ since the yields of fish have been decidedly modest—certainly, when judged against their contribution towards meeting global nutritional needs—yet the damage sustained by the marine environment in the process has often been substantial. These

[33] MR Clark et al, 'The Impacts of Deep-Sea Fisheries on Benthic Communities: A Review' (2016) 73 (Supplement) ICES Journal of Marine Science 51 at 52.
[34] T Morato, WWL Cheung and TJ Pitcher, 'Vulnerability of Seamount Fish to Fishing: Fuzzy Analysis of Life History Attributes' (2006) 68 Journal of Fish Biology 209.
[35] A Pusceddu et al, 'Chronic and Intensive Bottom Trawling Impairs Deep-Sea Biodiversity and Ecosystem Functioning' (2014) 111 PNAS 8861 at 8861.
[36] P Puig et al, 'Ploughing the Deep Sea Floor' (2012) 489 Nature 286 at 289.
[37] Morato, *supra* note 11 at 25.
[38] Norse, *supra* note 18 at 317.
[39] J Clarke et al, 'A Scientific Basis for Regulating Deep-Sea Fishing by Depth' (2015) 25 Current Biology 2425.
[40] Morato, *supra* note 11 at 32.

concerns are amplified by the fact that such activities are pursued by relatively few states; hence, bottom fisheries inflict a dramatically disproportionate degree of harm upon the global commons relative to their numerical participants. The purported regulation of deep-sea ecosystems has duly generated particular tensions between states and interest groups, which have been reflected in the development of the relevant UNGA commitments—an ongoing process to which this article now turns.

III. THE EVOLVING INTERNATIONAL REGULATION OF DEEP-SEA BOTTOM FISHERIES

Until the present century, deep-sea bottom fisheries were subject to minimal legal oversight. By the late 1990s, deep-sea fishing on the high seas had become an increasingly lucrative enterprise, with species such as orange roughy and Antarctic toothfish having been 'discovered' as a particularly popular form of seafood, precipitating a dramatic expansion in both officially sanctioned and illicit activities. Conversely, however, as concerns began to mount over the continued expansion of fishing activities into deeper areas of the global oceans, it also became readily apparent that the pursuit of deep-sea stocks exposed acute governance gaps in the international framework for the regulation of fisheries, especially within ABNJ.

In this regard, three key deficiencies can be seen to have arisen at the material time. First, there were significant portions of the high seas for which RFMOs had yet to be established, therefore there were few pre-existing governance structures through which deep-sea fisheries might be addressed, even assuming that the requisite regulatory will was forthcoming to do so. Second, within the network of regulatory coverage that did exist, only four such bodies were then endowed with powers to address deep-sea stocks, with many RFMOs having been created to regulate specific species, notably tuna or salmon.[41] Third, compounding these regulatory lacunae, it was legally questionable among the small collective of actors with an explicit remit to govern deep-sea stocks whether this competence extended beyond the management of the target stock to also include consideration of the wider ecosystem impacts of such fisheries. Indeed, a strict interpretation of the mandates of these bodies at the time would suggest that only the Commission for the Conservation of Atlantic Marine Living Resources (CCAMLR) retained express powers to regulate both deep-sea

[41] Namely, the North-East Atlantic Fisheries Commission (NEAFC), the Northwest Atlantic Fisheries Organization (NAFO), the General Fisheries Commission for the Mediterranean (GFCM), and the Commission for the Conservation of Atlantic Marine Living Resources (CCAMLR).

species and the ecosystem impacts of fishing upon them.[42] Consequently, for most areas of the global oceans, deep-sea fisheries represented 'one of the last unregulated open-access frontiers, governed only by the general provisions of the UN Convention on the Law of the Sea.'[43]

<H2>1. Deep-Sea Fisheries and UNCLOS

Although UNCLOS prescribes overarching obligations to govern the pursuit of marine resources, this regime, by the turn of the twenty-first century, seemingly offered a limited degree of protection to deep-sea ecosystems in the face of proliferating fisheries. Such activities were not expressly considered in the negotiations at the third Conference on the Law of the Sea, from which the 1982 convention and its general framework for fisheries competences would ultimately emerge. Under UNCLOS, states enjoy extensive rights to utilize fisheries resources on the high seas[44] and in their respective exclusive economic zones (EEZs),[45] subject to broad obligations concerning the conservation of the stocks in question.[46] Within the EEZ, however, these obligations are primarily concerned with ensuring that fish stocks are managed in a way that consistently allows for harvesting at a maximum sustainable yield and that overfishing does not occur as a result, while also considering the inter-dependence of fish stocks.[47] Parallel requirements for the high seas are more circumspect, with states under the comparatively ambiguous obligation to exercise 'due regard',[48] although this concept would infer a requirement to pursue deep-sea fisheries in a manner that would not compromise the interests of other states, such as inflicting significant harm upon stocks and fragile ecosystems in the process.

Given that VMEs are primarily located in the vicinity of the seabed, the provisions of UNCLOS concerning the continental shelf are also relevant. A desire to address benthic fisheries in ABNJ was apparent in the genesis of the continental shelf regime, although attempts by some states to include demersal fish within the ambit of these provisions

[42] EJ Molenaar, 'Addressing Regulatory Gaps in High Seas Fisheries' (2005) 20 Intl J Marine & Coastal L 533 at 538.
[43] KM Gjerde and D Freestone, 'Unfinished Business: Deep-Sea Fisheries and the Conservation of Marine Biodiversity beyond National Jurisdiction' (2004) 19 Intl J Marine & Coastal L 209 at 209.
[44] UNCLOS, *supra* note 2, arts 87(1)(a), 116.
[45] *Ibid*, art 62.
[46] *Ibid*, arts 61 (exclusive economic zone [EEZ]), 117–19 (high seas).
[47] *Ibid*, art 61.
[48] *Ibid*, art 87(2).

ultimately failed.[49] Instead, the prevailing regulatory motivation was to secure effective national control over lucrative shellfish resources rather than protecting these ecosystems per se.[50] For benthic ecosystems that are (now) found within the limits of national jurisdiction, UNCLOS prescribes the conditions under which states may exercise sovereign rights over sedentary species located upon their continental shelves.[51] Due to the commercial and technical challenges inherent in harvesting sedentary species at advanced depths, Article 77 has been invoked relatively infrequently in a fisheries context, notwithstanding sporadic disputes as to whether particular species are fully 'sedentary' in nature[52] and the prospective competence of RFMOs over such resources if they are not.[53]

However, these provisions do not comprehensively address the position of deep-sea fisheries, which involve harvesting non-sedentary species in close proximity to the seabed as opposed to exploiting species that are widely considered to be a feature of the benthos itself. Limited controls were placed upon these activities in ABNJ by the earlier 1958 Convention on Fishing and Conservation of the Living Resources of the High Seas,[54] whereby 'fisheries conducted by means of equipment embedded in the floor of the sea in areas of the high seas adjacent to the territorial sea of a state' could be regulated if they had been long maintained and conducted by nationals of that state, and any resulting legislation allowed third parties to participate on an equal basis.[55] Under UNCLOS, sedentary species lie outside the scope of the EEZ regime and cannot be exploited without the express permission of the coastal state.[56] This position does allow for more stringent restrictions to be imposed on certain seabed

[49] S Borg, *Conservation on the High Seas: Harmonizing International Regimes for the Sustainable Use of Marine Resources* (2012) at 151 (observing a minority viewpoint that demersal fisheries were more appropriately regulated under the aegis of the continental shelf, since the survival of the stocks is 'intimately associated with the seabed').
[50] J Mossop, *The Continental Shelf beyond 200 Nautical Miles: Rights and Responsibilities* (2016) at 62. This engendered a special regime for sedentary species under the Convention on the Continental Shelf, 1958, 499 UNTS 311; see R Young, 'Sedentary Fisheries and the Convention on the Continental Shelf' (1961) 55 AJIL 359.
[51] UNCLOS, *supra* note 2, art 77(1). Sedentary species are defined in art 77(4) as 'organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant physical contact with the seabed or the subsoil.'
[52] Notably regarding crustaceans. Mossop, *supra* note 51 at 62–7.
[53] Eg, in January 2017, a District Court in Norway (erroneously) acquitted a Latvian vessel of unauthorized fishing for snow crabs on the Norwegian continental shelf on the basis that such stocks were governed by NEAFC, whereas Norway had not consented to the management of sedentary species by the Commission in these waters. I Dahl and E Johansen, *The Norwegian Snow Crab Regime and Foreign Vessels: A Commentary on the* Juras Vilkas *Decision of the Øst-Finnmark District Court*, available at <http://site.uit.no/jclos/2017/03/29/the-norwegian-snow-crab-regime-and-foreign-vessels-a-commentary-on-the-juras-vilkas-decision-of-the-ost-finnmark-district-court/>.
[54] Convention on Fishing and Conservation of the Living Resources of the High Seas, 1958, 559 UNTS 285.
[55] *Ibid*, art 13(1).
[56] UNCLOS, *supra* note 2, art 77(2).

fishing activities should the national authorities so decree; as noted below, pertinent international guidelines[57] and UNGA resolutions[58] have emphasized respect for the sovereignty of the coastal state in these areas.

However, there are clear limitations on the ability of a coastal state to restrict bottom fishing more holistically under the specific regime of the continental shelf, not least since '[t]he rights of the coastal State over the continental shelf do not affect the legal status of the superjacent waters or of the air space above those waters.'[59] Moreover, the exercise of these rights cannot 'infringe or result in any unjustifiable interference' with the rights and freedoms established under UNCLOS, which would include fishing.[60] Nevertheless, when applied in tandem with the use of EEZ powers to facilitate fishery closures and/or the creation of marine protected areas (MPAs), particular coastal states have been prepared to close significant portions of the continental shelf within 200 nautical miles to bottom fisheries as part of a strong national stance against destructive fishing methods.[61] These provisions are therefore not without considerable practical utility in the context of deep-sea ecosystems located within national waters.

The continental shelf provisions under UNCLOS also raise an intriguing regulatory question over the conduct of high seas bottom fishing in those areas of the continental shelf that lie beyond 200 nautical miles and for which the coastal state has sought to exercise its right to claim an outer continental shelf under Article 76 of UNCLOS. This inevitably generates scope for tension between, on the one hand, the prospective intention of a coastal state to implement provisions for the protection of seabed ecosystems in these areas and, on the other hand, the long-established rights to fish on the high seas under Article 87(2). As a general principle, Part VI of UNCLOS, which addresses the continental shelf, is guided by the entrenchment of the sovereign rights of coastal states over specific resources. As Joanna Mossop observes, there may be a narrow foundation to 'restrict the activities of other states, such as bottom trawling, if it is reasonably connected with the exploration and exploitation of

[57] *International Guidelines for the Management of Deep-Sea Fisheries in the High Seas* (2008), para 25 (*Deep-Sea Fishing Guidelines*).
[58] UNGA Resolution 71/123 (7 December 2016), paras 176, 177.
[59] UNCLOS, *supra* note 2, art 78(1).
[60] *Ibid*, art 78(2).
[61] Eg, approximately 58% of the Australian EEZ is closed to bottom trawling—albeit encompassing significant locations wherein no trawling occurs—including a number of sites with a high volume of benthic fauna. TK Mazor et al, 'Trawl Exposure and Protection of Seabed Fauna at Large Spatial Scales' (2017) 23 Diversity and Distributions 1280 at 1288.

sedentary species.'[62] The opportunity to curtail bottom fishing would therefore appear to be limited, given that Article 77 is effectively silent on the conservation and management of the continental shelf.

Similarly, the unilateral declaration of a MPA in these areas for such purposes, and concurrent restrictions on high seas fishing, may be less readily accepted and observed by other states in the absence of some further layer of regulatory legitimacy, such as the support of an influential multilateral body. The limited degree of current practice suggests that states are receptive to national attempts to protect marine features on the outer continental shelf under particular circumstances, as illustrated by the assertion of Portuguese sovereignty over the 'Rainbow', a large hydrothermal vent ecosystem discovered off the coast of the Azores in what had then constituted ABNJ. In 2005, a proposal was under development to establish the 'Rainbow' as a MPA under the auspices of the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention), when Portugal coincidentally sought to assert jurisdiction over the area as part of its prospective outer continental shelf.[63] Shortly afterwards, Portugal proposed the area to the OSPAR Commission as a MPA in its individual capacity, a process that was endorsed by the other parties in what has been interpreted as a pioneering legal recognition of the environmental jurisdiction of the coastal state over these areas prior to a formal recommendation by the Commission on the Limits of the Continental Shelf (CLCS), even if Portuguese control over these features was conditional at best.[64] The 'Rainbow' arrangements may ultimately be viewed in their own unique circumstances, given that there was widespread support within the region for their protection, while fisheries considerations were largely absent from this decision. However, future declarations of this nature could generate significant friction if exercised with respect to the seabed below an important high seas fishing area and in the context of a more ambivalent view of the coastal state's appreciation for particular submarine features.

Conversely, the reverence for coastal state sovereignty over the continental shelf may have implications for seabed features in ABNJ that have been previously protected as the CLCS duly returns its recommendations as to the entitlements of states to extended territory in particular regions, thereby potentially repatriating some of these areas to national

[62] J Mossop, 'The Relationship between the Continental Shelf Regime and a New International Instrument for Protecting Marine Biodiversity in Areas beyond National Jurisdiction' (2017) 74 ICES Journal of Marine Science 444 at 448 (emphasis added).
[63] Convention for the Protection of the Marine Environment of the North-East Atlantic, 1992, 2354 UNTS 67 (OSPAR Convention).
[64] MC Ribeiro, 'The "Rainbow": The First National Marine Protected Area Proposed under the High Seas' (2010) 25 Intl J Marine & Coastal L 183 at 191–2.

jurisdiction.[65] This raises the theoretical possibility that a seabed feature that was protected by a multilateral regulator while this area lay beyond national jurisdiction might be divested of this status when returned to national control. It remains to be seen how such areas will eventually be treated under these circumstances since national law would technically supersede these prior arrangements.[66] As observed below, given that a broad duty to protect the marine environment is prescribed under UNCLOS, which would also apply to Article 77, while the various UNGA resolutions also call upon states to protect VMEs in their individual capacity, it is nevertheless tenable to suggest that the prior status of these features should not be without consequence in any transition to national control, especially where the coastal state in question has endorsed the initial protective designation.

While the UNCLOS provisions concerning EEZs, continental shelves, and high seas address the broad entitlements of states over the pursuit of natural resources, they do not consider the wider environmental ramifications of such activities. VMEs are instead technically caught within Part XII, which addresses the protection and preservation of the marine environment, wherein Articles 192 and 194(5) of UNCLOS provide 'a rudimentary framework for the control of fishing methods.'[67] Article 192 concisely stipulates that '[s]tates have the obligation to protect and preserve the marine environment.' Despite the simplicity of this formulation, Article 192 holds considerable significance as a guiding principle for the regulation of fisheries. Indeed, it has been expressly confirmed in a fisheries context that 'the conservation of the living resources of the sea is an element in the protection and preservation of the marine environment'[68] and that this obligation unequivocally applies to 'all maritime areas, including those encompassed by exclusive economic zones.'[69] Moreover, it has been recently expounded that Article 192 'extends to the prevention of harms that would affect depleted, threatened, or endangered species indirectly through the destruction of their habitat,' which would further clarify the value of this provision as a regulatory platform for

[65] See R Churchill, 'The Growing Establishment of High Seas Marine Protected Areas: Implications for Shipping' in R Caddell and R Thomas, eds, *Shipping, Law and the Marine Environment in the Twenty-First Century* (2013) 53 at 65–8 (noting that the settlement of outer continental shelf claims may affect current designations of protected seabed features in the northeast Atlantic region).
[66] Ribeiro, *supra* note 65 at 191.
[67] EJ Goodwin, 'Threatened Species and Vulnerable Marine Ecosystems' in DR Rothwell et al, eds, *The Oxford Handbook of the Law of the Sea* (2015) 799 at 808.
[68] *Southern Bluefin Tuna (New Zealand v Japan; Australia v Japan),* ITLOS Case no 3 and 4, Order on Provisional Measures, 27 August 1999, para 70.
[69] *Request for an Advisory Opinion Submitted by the Sub-Regional Fisheries Commission (SRFC)*, ITLOS Case no 21, Advisory Opinion, 2 April 2015, para 120 (*Request by the SRFC*). The distinction is significant as it defeats the premise that Part V of UNCLOS, which prescribes particular environmental responsibilities over the EEZ, might lie outside the wider considerations of art 192.

the protection of deep-sea ecosystems.[70] The implications of this provision are therefore considerable since it imposes an obligation of due diligence upon states to ensure that nationally registered vessels adhere to relevant conservation and management measures during the conduct of fishing activities.[71]

Likewise, Article 194 concerns 'measures to prevent, control and reduce pollution of the marine environment.' Nevertheless, it has recently been confirmed that the scope of this provision should be interpreted more broadly than its titular intent would immediately suggest, since Article 194 is 'not limited to measures aimed strictly at controlling marine pollution.'[72] This is important from the standpoint of VMEs as Article 194(5) provides that measures undertaken pursuant to Part XII 'shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.' Moreover, it has been asserted that the general obligation to protect the marine environment advanced in Article 192 is 'given particular shape in the context of fragile ecosystems by Article 194(5).'[73] Accordingly, if a state is deemed to have knowledge that its vessels are conducting destructive fishing activities, a failure to enforce such measures may constitute a breach of the obligation of due diligence, as was determined in the context of damage wrought to fragile coral ecosystems by Chinese vessels in contested areas of the South China Sea.[74]

Recent decisions by international courts and tribunals have therefore established the protection of fragile benthic features as a significant component of the obligations incumbent in Part XII of UNCLOS. Nevertheless, in returning to the regulatory position of the early twenty-first century, it was by no means axiomatic that such a robust interpretation of these obligations applied in the context of the deep sea, and strong doubts were expressed over the adequacy of the international legal framework to facilitate the effective protection of seabed ecosystems from proliferating fisheries.[75] Indeed, it may be speculated that the strong statements recently expressed by a number of courts and tribunals concerning the interpretation of Articles 192 and 194 in the context of fisheries may have been informed, to

[70] *South China Sea Arbitration (Republic of the Philippines v Peoples' Republic of China)*, PCA Case no 2013-19, Award, 12 July 2016, para 959.
[71] *Request by the SRFC*, *supra* note 70, paras 118–40.
[72] *Chagos Marine Protected Area Arbitration (Mauritius v United Kingdom)*, PCA Case no 2011-03, Award, 18 March 2015, para 320.
[73] *South China Sea Arbitration*, *supra* note 71, para 959.
[74] *Ibid*, paras 964–6.
[75] Gjerde and Freestone, *supra* note 44 at 209.

at least some degree, by the expanding cohort of commitments towards VMEs developed in the decade preceding this litigation.

The general regulatory framework for fisheries advanced under UNCLOS has been buttressed by the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA).[76] While the UNFSA applies expressly to straddling and highly migratory fish stocks, it has nonetheless provided a rich source of inspiration for the further development of the governance regime for fisheries. More specifically, as explored in fourth section of this article, it has facilitated the establishment of an increased number of far-sighted RFMOs, thereby promoting the closure of a number of previous governance gaps and ensuring that these institutions are imbued with an enhanced environmental mandate. In the context of VMEs, three particular features of the UNFSA have transpired to be of considerable value. First, Article 5(g) promotes the need to 'protect biodiversity in the marine environment' as a general principle for the application of the agreement, establishing ecosystem considerations as a more central element of the consideration of post-UNFSA RFMOs than had previously been the case. Just as significantly, however, a degree of 'retro-fitting' of these commitments has also been apparent in the mandates of some of the pre-UNFSA RFMOs, thus establishing environmental considerations more centrally within the work of these bodies, which has promoted a greater focus upon deep-sea ecosystems. Second, and allied to this, under Article 7(5), parties are required 'in a spirit of understanding and cooperation [to] make every effort to enter into provisional arrangements of a practical nature.' Consequently, as observed in the fourth section of this article, a number of provisional arrangements pending the creation of a formal RFMO have facilitated the interim development of conservation measures to specifically protect deep-sea ecosystems.

Third, and perhaps most significantly, Article 6 mandates the application of the precautionary approach to fisheries, including an obligation for states to proceed with greater caution 'where information is uncertain, unreliable or inadequate.'[77] Moreover, Article 6(6) of the UNFSA expressly contemplates the application of specific governance principles where a 'new' or 'exploratory' fishery is to be established. Accordingly, where fisheries operations are to prospectively expand into new areas or depths, or to address previously

[76] UNFSA, *supra* note 8.
[77] *Ibid*, art 6(2).

unfished species, the UNFSA requires the application of cautious conservation measures to facilitate the acquisition of sufficient catch data to assess the impacts of fishing on the long-term sustainability of the stocks. Thereafter, if appropriate, conservation and management measures may be adopted to allow for the gradual development of the fishery and its eventual transition to commercial management. While the regime of new and exploratory fisheries continues to generate threshold questions and uncertainty as to how such measures are to be applied, a number of RFMOs have expressly developed a precautionary position on exploratory bottom fisheries that stems from the influence of UNGA commitments, which may be increasingly considered to represent the minimum standards for such activities in the deep-sea environment.[78] In addition to these influences, the periodic review conferences of the UNFSA have also provided a prominent platform for the further political endorsement of standards to protect deep-sea ecosystems,[79] notwithstanding a minority viewpoint among the parties that such endeavours are best promoted under the aegis of the UNGA itself.[80]

<H2>2. The Emergence and Evolution of UNGA Commitments

By the early 2000s, it was increasingly clear that the general framework of UNCLOS had not facilitated the tailored regulatory strategies necessary for the effective protection of deep-sea ecosystems. In addition to the governance gaps exposed by the complications surrounding RFMO competences over the deep-sea itself, significant challenges were also evident in identifying an effective forum through which such standards might ultimately be developed. As concerns mounted over the further proliferation of bottom fisheries, strong divergences of opinion arose over whether deep-sea fishing would be more appropriately addressed through binding or non-binding means.[81] Moreover, it was not initially apparent which international platform would be most politically receptive to calls for the improved governance of these activities, nor which institution would be best placed to introduce regulatory standards if global opinion could ultimately be mobilized in this direction.

[78] R Caddell, 'Precautionary Management and the Development of Future Fishing Opportunities: The International Regulation of New and Exploratory Fisheries (2018) 33 Intl J Marine & Coastal L 199 at 248–59.
[79] *Report of the Resumed Review Conference of the UNFSA 2010*, Doc A/CONF.210/2010/7 (2010), para 57; *Report of the Resumed Review Conference of UNFSA 2016*, Doc A/CONF.210.2016/5 (2016), para 84.
[80] *Report of the Resumed Review Conference of the UNFSA 2006*, Doc A/CONF.210/20016/15 (2016), paras 29, 56.
[81] See DA Balton and DC Zbicz, 'Managing Deep-Sea Fisheries: Some Threshold Questions' (2004) 19 Intl J Marine & Coastal L 247 at 252–5.

In this regard, since the early 1990s, the UNGA has represented a somewhat unheralded, yet expedient and influential, forum for the elaboration of governance objectives for ABNJ. Notably, the UNGA offers the advantage of providing the legitimacy of a suitably global platform for such discussions, while also effectively skirting the vexed question of whether the resulting provisions should be binding and thereby trigger more substantive consequences if they are not fully implemented. Aside from internal organizational matters, the eclectic and extensive resolutions adopted annually by the UNGA do not have binding effect. Nevertheless, this does not divest them of broader regulatory significance. Indeed, they evidently have an intriguing role to play in the development of international standards to address certain problematic issues affecting the global commons, not least in the context of fisheries and ABNJ. One manifestation of their practical value is as a means of identifying and articulating desirable objectives, which in turn may catalyze further governance developments. Thus, as James Harrison observes, such instruments may not themselves constitute law-making tools, but they have instead exerted a more nuanced influence on state practice by 'drawing attention to the current threats to fish stocks and encouraging international efforts taking place in other institutions to address them.'[82]

Moreover, the annual UNGA resolutions addressing the law of the sea provide an opportunity to contemplate particular issues that were not foreseen at the time of the negotiations at the third Conference on the Law of the Sea.[83] Accordingly, they may be considered to represent an important tool to facilitate the progressive development of a treaty that was always intended to mature organically to adapt to changing circumstances. Alternatively, Kristina Gjerde interprets the attention given by the UNGA to bottom fishing and other environmental dilemmas within ABNJ as a *failure* of IEG, representing a disturbing trend whereby the inability of UNCLOS to address depleted fisheries and ecosystem concerns effectively has increasingly displaced the necessary discussion of these pressing issues into other globalized fora.[84]

Nevertheless, UNGA resolutions have proved valuable in addressing destructive fishing practices. An intriguing precedent was set in the early 1990s concerning large-scale driftnet fishing on the high seas, whereby UNGA resolutions provided a compelling stimulus for subsequent regulatory activity by RFMOs, states, and other actors. Due to their propensity

[82] J Harrison, *Making the Law of the Sea: A Study in the Development of International Law* (2013) at 204.
[83] D Diz Pereira Pinto, *Fisheries Management in Areas beyond National Jurisdiction: The Impact of Ecosystem-Based Law-Making* (2013) at 65.
[84] KM Gjerde, 'High Seas Fisheries Management under the Convention on the Law of the Sea' in D Freestone, R Barnes and D Ong (eds), *The Law of the Sea: Progress and Prospects* (2006) 281 at 295.

to take large numbers of juvenile fish and non-target species as by-catches, modern driftnets are highly controversial.[85] By 1992, drawing on preceding regional initiatives,[86] a series of pioneering UNGA resolutions had been adopted to progressively limit the use of driftnets, culminating in a moratorium on all such nets above 2.5 kilometres in length on the high seas.[87] These restrictions were rapidly accepted by the vast majority of states—including those that had resolutely opposed the resolutions[88] and non-members of the UN[89]—as well RFMOs and other pertinent multilateral actors, leading to the strong argument that this position now represents customary international law,[90] notwithstanding some misgivings over the suitability of the UNGA as a forum for the development of technical fisheries standards.[91]

The UNGA driftnet resolutions nonetheless provided a helpful regulatory template with which to address the growing international concerns over deep-sea bottom fishing. From approximately 2000 onwards, these concerns initially manifested themselves in a rather ambiguous recognition of the pernicious impacts of under-regulated fishing upon marine ecosystems, as a series of bodies expressed the need for some form of action to be taken, albeit without identifying under whose auspices this ought to occur.[92] Indeed, this generated a plethora of statements from a host of institutions, largely nominating each other to ascertain the scale of the problem and facilitate a regulatory solution. The rather circular result, as one contemporaneous account wryly surmised, was 'an increasingly long-winded and complex series of decisions and resolutions, [whereby] each of these bodies has done little except to call upon other bodies to take action, without necessarily specifying very clearly what that action might be.'[93]

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[85] A Wright and DJ Doulman, 'Driftnet Fishing in the South Pacific: From Controversy to Management' (1991) 15 Marine Policy 303 at 313–14.
[86] See further R Caddell, 'Caught in the Net: Driftnet Fishing Restrictions and the European Court of Justice' (2010) 22 J Envtl L 301 at 301–4.
[87] UNGA Resolution 46/215 (20 December 1991), para 4; preceded by UNGA Resolution 44/255 (22 December 1989); UNGA Resolution 45/197 (21 December 1990). See further DR Rothwell, 'The General Assembly Ban on Driftnet Fishing' in D Shelton, ed, *Commitment and Compliance: The Role of Non-Binding Norms in the International Legal System* (2003) 121 at 126–31.
[88] I Miyaoka, *Legitimacy in International Society: Japan's Response to Global Wildlife Preservation* (2004) at 65.
[89] B Miller, 'Combating Drift-Net Fishing in the Pacific' in J Crawford and DR Rothwell, eds, *The Law of the Sea in the Asian Pacific Region* (1995) 155 at 166.
[90] GJ Hewison, 'The Legally Binding Nature of the Moratorium on Large-Scale High Seas Driftnet Fishing' (1994) 25 J Maritime L & Commerce 557.
[91] WT Burke, M Freeberg and EL Miles, 'United Nations Resolutions on Driftnet Fishing: An Unsustainable Precedent for High Seas and Coastal Fisheries Management' (1994) 25 Ocean Dev & Intl L 127 at 137.
[92] LA Kimball, 'Deep-Sea Fisheries of the High Seas: The Management Impasse' (2004) 19 Intl J Marine & Coastal L 259 at 263–72.
[93] MW Lodge, 'Improving International Governance in the Deep Sea' (2004) 19 Intl J Marine & Coastal L 299 at 301.

The UNGA was not immune to these criticisms, observing in 2002 the need for 'relevant international organizations … to consider urgently ways to integrate and improve, on a scientific basis, the management of risks to marine biodiversity of seamounts and certain other underwater features within the framework of [UNCLOS].'[94] A more specific basis for regulatory activity, however, would soon be forthcoming. In early 2004, the Convention on Biological Diversity (CBD) convened its seventh Conference of the Parties,[95] adopting a resolution that echoed the sentiments of the previous UNGA resolutions as to the plight of marine biodiversity in ABNJ and the need to establish protected areas to conserve 'seamounts, hydrothermal vents, cold-water corals, and other vulnerable ecosystems.'[96] The parties to the CBD thus acknowledged that 'the law of the sea provides a legal framework for regulating activities in marine areas beyond national jurisdiction'[97] and appealed for widespread international support for the UNGA in identifying appropriate mechanisms to establish MPAs for these submarine features and ecosystems. Shortly afterwards, an influential collective of non-governmental organizations lobbied the UN Open-Ended Consultative Process on Oceans and the Law of the Sea—an increasingly important stage in the process through which the UNGA develops its regulatory position on marine affairs—for a moratorium on high seas bottom trawling. Later that year, having been identified as the most suitable forum for further policy direction, the UNGA duly adopted its first major resolution addressing elements of the deep-sea environment.[98]

To this end, in four core paragraphs, Resolution 59/25 laments a general lack of regulatory competence for the regulation of particular marine ecosystems and requests a variety of actors to seek to rectify these governance challenges as a matter of priority. Most notably, paragraph 66 of Resolution 59/25 calls upon states,

<Q>either by themselves or through regional fisheries management organizations or arrangements, where these are competent to do so, to take action urgently, and consider on a case-by-case basis and on a scientific basis, including the application of the precautionary approach, the interim prohibition of destructive fishing practices, including bottom trawling that has adverse impacts on vulnerable marine ecosystems, including seamounts, hydrothermal vents and cold water corals located beyond

[94] UNGA Resolution 57/141 (12 December 2002), para 56.
[95] Convention on Biological Diversity, 1992, 1760 UNTS 79.
[96] Decision VII/5 on Marine and Coastal Biological Diversity, Doc UNEP/CBD/COP/DEC/VII/5 (13 April 2004), para 30.
[97] Ibid, para 31.
[98] UNGA Resolution 59/25 (17 November 2004).

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national jurisdiction, until such time as appropriate conservation and management measures have been adopted in accordance with international law.<Q>

The phrasing of paragraph 66 is significant. It represents an inaugural (and undefined) use of the term 'vulnerable marine ecosystem,' which has subsequently become a ubiquitous addition to the lexicon of marine governance. The commitment to seek the interim prohibition of destructive practices on a case-by-case basis nonetheless falls considerably short of the moratorium on deep-sea fishing in its entirety that had been sought in particular quarters and had indeed been initially endorsed in earlier drafts of the resolution with regard to ABNJ.[99] Moreover, the appeal for further action can be construed broadly and is not restricted to bottom trawling, even if this is, in practice, the most pressing fisheries-related threat to the categories of ecosystems identified within the text. Likewise, the paragraph is drafted in a manner that suggests that such actions are not mandated solely for ABNJ. A more extensive interpretation of the suite of activities caught within the purview of the resolution is therefore appropriate, both substantively and geographically. Accordingly, while the regulation of high seas bottom trawling is undoubtedly the core aim of Resolution 59/25, these provisions are ultimately directed at destructive fishing practices generally and may be construed as addressing particular marine features that are present both within and beyond the limits of national jurisdiction.

Buttressing these recommendations, Resolution 59/25 calls upon those RFMOs with competence over bottom fisheries to 'urgently' adopt conservation and management measures in accordance with international law to address destructive fishing practices, including bottom fishing that has adverse impacts on VMEs, and to ensure compliance with such measures. Prospectively, the members of RFMOs that lacked these competences at the time were requested to extend these pre-existing mandates to regulate bottom fisheries,[100] while the international community was urged to cooperate in the creation of new RFMOs for unregulated areas of the global oceans, which would be endowed with these powers *ab initio* and, thereby, be able to address deep-sea fishing as an immediate priority upon their inception.

[99] Y Takei, *Filling Regulatory Gaps in High Seas Fisheries: Discrete High Seas Fish Stocks, Deep-Sea Fisheries and Vulnerable Marine Ecosystems* (2013) at 113.
[100] Resolution 59/25, *supra* note 99, para 68. These operative paragraphs are not entirely coherent and consistent, attributed to 'its compromise nature and the fact that it does not contain the clear-cut prohibition on bottom fishing in areas beyond national jurisdiction that some UN member States and NGOs had sought.' R Churchill and D Owen, *The EC Common Fisheries Policy* (2010) at 121.

Two years later, an arguably more influential resolution was adopted by the UNGA, expressing dissatisfaction with the rate of progress since 2004 and calling for steps to be taken 'immediately' to sustainably manage deep-sea fish stocks and VMEs.[101] Significantly, paragraph 83 of Resolution 61/105 listed for the first time a series of targeted action points for RFMOs to complete before a deadline of 31 December 2008, namely:

<Q>(a) To assess, on the basis of the best available scientific information, whether individual bottom fishing activities would have significant adverse impacts on vulnerable marine ecosystems, and to ensure that if it is assessed that these activities would have significant adverse impacts, they are managed to prevent such impacts, or not authorized to proceed;
(b) To identify vulnerable marine ecosystems and determine whether bottom fishing activities would cause significant adverse impacts to such ecosystems and the long-term sustainability of deep sea fish stocks, inter alia, by improving scientific research and data collection and sharing, and through new and exploratory fisheries;
(c) In respect of areas where vulnerable marine ecosystems, including seamounts, hydrothermal vents and cold water corals, are known to occur or are likely to occur based on the best available scientific information, to close such areas to bottom fishing and ensure that such activities do not proceed unless conservation and management measures have been established to prevent significant adverse impacts on vulnerable marine ecosystems;
(d) To require members of the regional fisheries management organizations or arrangements to require vessels flying their flag to cease bottom fishing activities in areas where, in the course of fishing operations, vulnerable marine ecosystems are encountered, and to report the encounter so that appropriate measures can be adopted in respect of the relevant site.<Q>

Resolution 61/105 therefore represents a more nuanced series of restrictions upon bottom fisheries, whereby such commitments are triggered only where there is a threat of a significant adverse impact on VMEs. The regulatory onus is placed upon identifying locations within which VMEs are present and in establishing a precautionary requirement for vessels to cease fishing upon encountering such features or pre-emptively closing these areas to bottom fishing until it may be established that no such encounters are likely to result from either commercial or exploratory fishing activities. In principle, this allows for the co-existence of fisheries and environmental restrictions in locations that are identified as susceptible to the adverse impacts of deep-sea bottom fishing if not managed proactively.

[101] UNGA Resolution 61/105 (8 December 2006), para 80.

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Nevertheless, Resolution 61/105 raised immediate interpretive difficulties since the thresholds by which a marine ecosystem may be considered 'vulnerable' and an adverse impact deemed 'significant'—and, indeed, the circumstances under which an 'encounter' may be considered to have occurred in the first place—were not defined further; hence, the FAO was called upon to elaborate detailed practical guidance on these issues.[102] Resolution 61/105 also recommended the expedited development of interim measures to address locations without operational RFMO coverage[103] and, for the first time, directed specific action points to states in areas for which no competent authority was in existence, requesting flag states to cease the authorization of fishing vessels in ABNJ without a competent RFMO or to unilaterally introduce measures applicable to nationally registered ships to implement the broad commitments advanced therein.[104]

In 2008, following an extensive technical consultation process, the FAO adopted its International Guidelines for the Management of Deep-Sea Fisheries in the High Seas (Deep-Sea Fishing Guidelines) to frame the practical implementation of the relevant UNGA resolutions for fisheries exploiting deep-sea species 'in a targeted or incidental manner.'[105] The guidelines expressly apply to ABNJ—although states are also encouraged to adopt these approaches where appropriate within their national waters—and involve fisheries for which the total catch includes species that can only sustain low exploitation rates and where the fishing gear used in this process is likely to contact the sea floor during the course of fishing operations.[106] The guidelines therefore seek to ensure the long-term and sustainable use of marine living resources in the deep sea and to prevent significant adverse impacts upon VMEs in the process.[107] To this end, states and RFMOs are requested to adopt and implement measures consistent with the precautionary and ecosystem approaches to fisheries management, and in conformity with UNCLOS and other pertinent rules of international law, to identify areas in which VMEs are known or likely to occur and to take action using the best available information.[108]

The guidelines were swiftly endorsed by the UNGA, which called upon states to secure their implementation 'immediately, individually and through regional fisheries

[102] *Ibid*, para 89.
[103] *Ibid*, para 85.
[104] *Ibid*, para 86.
[105] *Deep-Sea Fishing Guidelines, supra* note 58, para 5.
[106] *Ibid*, para 8. The total catch is defined herein as 'everything brought up by the gear,' reinforcing the notion that the guidelines ought to be applied even where deep-sea species are taken incidentally.
[107] *Ibid*, para 11.
[108] *Ibid*, para 12.

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management organizations and arrangements.'[109] Nevertheless, it was observed that the operative paragraphs of the previous UNGA resolutions had not been 'sufficiently implemented in all cases.'[110] Accordingly, Resolution 64/72 reiterated the action points called for in Resolution 61/105, adding a further commitment to promote the adoption of conservation and management measures to ensure the long-term sustainability of deep-sea stocks and associated species, particularly by setting appropriate levels for fishing effort, capacity, and catch limits.[111] This was reinforced in 2011, wherein the UNGA observed that 'despite the progress made, the urgent actions called for in the relevant paragraphs of resolutions 61/105 and 64/72 have not been fully implemented in all cases.'[112] In a notable departure to the previous instruments, Resolution 66/68 further called for the strengthening of assessment procedures so as 'to take into account individual, collective and cumulative impacts, and for making the assessments publicly available, recognizing that doing so can support transparency and capacity-building globally.'[113]

Accordingly, an evolving suite of priority activities has been established across a series of UNGA resolutions, which have been implemented with varying degrees of priority and consistency by the collective of RFMOs exercising competence over deep-sea fisheries, alongside a degree of unilateral activity by particular states and entities to address bottom fishing activities conducted in ABNJ.

<H1>IV. IMPLEMENTING AND ADVANCING THE UNGA VME RESOLUTIONS

Since the first bottom-fishing restrictions were contemplated in UNGA Resolution 59/25, eight fisheries management bodies have established competence over deep-sea fisheries, each of which has developed policies to at least some extent to address these activities. These bodies encompass the NEAFC, the Northwest Atlantic Fisheries Organization (NAFO), the Southeast Atlantic Fisheries Organization (SEAFO), the Southern Indian Ocean Fisheries Agreement (SIOFA), the North Pacific Fisheries Commission (NPFC), the General Fisheries Commission for the Mediterranean (GFCM), the South Pacific Regional Fisheries Management Organization (SPRFMO), and CCAMLR. This cohort is further complemented by the EU, which is not a RFMO but exercises extensive fisheries powers and has acted

[109] Resolution 64/72 (4 December 2009), para 113.
[110] *Ibid*, para 118.
[111] *Ibid*, para 119(d).
[112] Resolution 66/68 (6 December 2011), para 129.
[113] *Ibid*, para 129(a).

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unilaterally to promote standards for bottom fishing in ABNJ inspired by these UNGA commitments.

Despite an expanding degree of regulation for deep-sea bottom fisheries in ABNJ, the work of these bodies rather defies neat comparative analysis. Each RFMO presides over a unique set of ecological conditions (and, thereby, differing volumes of VMEs to manage), different fishing industries, and varying political, material, and financial resources and priorities. Moreover, the constituent treaties of each of these bodies are also different, thereby conferring differing mandates upon them. Some have been established in the past decade and have thus been guided by modern marine conservation influences, notably the UNFSA and, indeed, the regulatory commitments of the UNGA resolutions. Others represent older structures and, in one notable case, have required extensive 'retro-fitting' in order to promote an ambitious and proactive stance towards VMEs. Accordingly, in reviewing the implementation of the UNGA commitments, it is perhaps more appropriate to identify core trends, mutual deficiencies, and innovative practices, given the absence of a unified set of natural and regulatory conditions between these regimes. The following section thus examines progress towards advancing what may be considered the core cumulative requirements of the UNGA resolutions, namely, the need to identify VMEs and to regulate fishing effort accordingly; closing governance gaps within ABNJ whereby VMEs may be affected by fishing activities; and the closure of areas of particular ecological sensitivity to deep-sea bottom fishing.

<H2>1. Mapping VMEs and Managing Encounters

A prominent commitment established across the suite of UNGA resolutions is the need to identify VMEs and to institute precautionary management measures to protect them from significant adverse impacts of bottom fishing. Nevertheless, as observed above, the ambitious objectives promoted within the resolutions have not been accompanied by clear articulations of key concepts. Accordingly, considerable importance was vested in the elaboration of the Deep-Sea Fishing Guidelines to provide practical guidance for RFMOs in framing conservation and management measures towards VMEs within their respective areas of activity. To this end, the guidelines describe vulnerability as being

<Q>related to the likelihood that a population, community, or habitat will experience substantial alteration from short-term or chronic disturbance, and the likelihood that it would recover and in what

time frame. These are, in turn, related to the characteristics of the ecosystems themselves, especially biological and structural aspects. VME features may be physically or functionally fragile. The most vulnerable ecosystems are those that are both easily disturbed and very slow to recover, or may never recover.[114]<Q>

Moreover, the guidelines observe that this is a relative concept; hence, features that are 'physically fragile or inherently rare' may be vulnerable to most impacts, while other populations, communities, or habitats may be more resilient and therefore not necessarily 'vulnerable' in particular contexts.[115] This position reflects the earlier rejection of a proposed blanket ban on bottom trawling, with a number of states having reiterated concerns that such fisheries do not automatically provoke catastrophic impacts upon marine ecosystems and also represent a significant source of global food security.[116] In this regard, the guidelines note that the risks to a marine ecosystem are measured 'by its vulnerability, the probability of a threat occurring and the mitigation means applied to the threat.'[117]

The Deep-Sea Fishing Guidelines also elaborate a series of representative characteristics that should be used as criteria in identifying VMEs—namely, the uniqueness or rarity of an area or ecosystem; the functional significance of the habitat; the fragility of the area; the life history traits of component species that would make recovery difficult (as exhibited in many species of deep-sea fish); and the structural complexity of an ecosystem.[118] Although a further, non-exhaustive, series of examples are listed in an annex to the guidelines, the individual geological conditions of each region mean that the ultimate decision as to whether a particular site or ecosystem constitutes a VME is made by the RFMO in question. Accordingly, the practice of RFMOs has been to develop extensive individual lists of indicator species and ecosystems.

Arriving at a definitive judgment as to the existence of a VME is nevertheless a highly complex task and one that will be subject to constant revision in light of ongoing data-collection requirements. It is also fraught with uncertainty, given the exceptionally limited baseline knowledge of the myriad complexities in interactions between features and species

[114] *Deep-Sea Fishing Guidelines*, *supra* note 58, para 14.
[115] *Ibid*, para 15.
[116] *Impacts of Fishing on Vulnerable Marine Ecosystems: Actions Taken by States and Regional Fisheries Management Organizations and Arrangements to Give Effect to Paragraphs 66 to 69 of General Assembly Resolution 59/25 on Sustainable Fisheries, Regarding the Impacts of Fishing on Vulnerable Marine Ecosystems: Report of the Secretary-General*, UN Doc A/61/154 (<2006~~?~~>), para 59.
[117] *Deep-Sea Fishing Guidelines*, *supra* note 58, para 16.
[118] *Ibid*, para 42.

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that constitute and populate particular marine areas. The capacity of parties to RFMOs to constantly monitor such ecosystems—even within areas in which significant research activities have been conducted, let alone those that are currently unfished and largely unexplored—is highly variable, while assessing whether such areas might be sufficiently resilient to prospectively support fishing activities is also a complicated undertaking. Consequently, fishing in such areas exemplifies precisely the type of situation wherein the precautionary approach to fisheries management ought to be taken, which has prompted calls for institutional restraint and continued demands for a moratorium on such activities in ABNJ.[119]

The identification of VMEs by individual RFMOs provides scope for sharing examples of best practice between RFMOs, as mandated both by successive UNGA resolutions and, indeed, the Deep-Sea Fishing Guidelines themselves.[120] Nevertheless, this initially proved problematic, with concerns having been expressed that support tools were initially limited,[121] with few opportunities for institutional learning between RFMOs.[122] This has subsequently improved markedly, particularly through the development of a VME database maintained by the FAO, which allows for a further degree of cross-reference and comparison. Nevertheless, opportunities for the eight RFMOs that are competent to address deep-sea fishing to actively meet and evaluate best practices—reminiscent of the collaboration between the group of RFMOs that regulate single species[123]—appear distinctly limited, with incompatible meeting schedules and other operational priorities having stymied attempts to facilitate further institutional interactions.[124]

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[119] Norse, *supra* note 18 at 317.
[120] *Deep-Sea Fishing Guidelines*, *supra* note 58, para 29.
[121] *Actions Taken by States and Regional Fisheries Management Organizations and Arrangements to Give Effect to Paragraphs 83 to 90 of General Assembly Resolution 61/105 on Sustainable Fisheries, Including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and Related Instruments: Report of the Secretary*-General, UN Doc A/64/305 (<2009>), para 202.
[122] *Actions Taken by States and Regional Fisheries Management Organizations and Arrangements in Response to Paragraphs 80 and 83 to 87 of General Assembly Resolution 61/105 and Paragraphs 113 to 117 and 119 to 127 of General Assembly Resolution 64/72 on Sustainable Fisheries, Addressing the Impacts of Bottom Fishing on Vulnerable Marine Ecosystems and the Long-Term Sustainability of Deep-Sea Fish Stocks: Report of the Secretary-General*, UN Document A/66/307 (<2011>), para 207 (*Actions Taken by States*).
[123] Since 2007, the various tuna regional fisheries management organizations (RFMOs) have participated in the Kobe process of cooperation to streamline regulatory and administrative activities on issues of common concern.
[124] *Record of the Meeting of the Deep-Sea Secretariats Contact Group* (June 2016) at 4. This forum was opportunistically established in 2016 when seven of these eight RFMOs were involved in a different FAO meeting, although appears likely to remain ad hoc in nature.

Where VMEs have been identified, the Deep-Sea Fishing Guidelines also tentatively outline the context in which a significant adverse impact is deemed to have occurred. Such an encounter is one in which ecosystem integrity is compromised in a manner that '(i) impairs the ability of affected populations to replace themselves; (ii) degrades the long-term natural productivity of habitats; or (iii) causes, on more than a temporary basis, significant loss of species richness, habitat or community types. Impacts should be evaluated individually, in combination and cumulatively.'[125] The risk of a significant adverse impact therefore triggers further mitigation strategies, primarily in the form of the 'move-on' rule, which requires a vessel to retreat to a particular distance away from the VME in question. To this end, a number of RFMOs have developed encounter protocols, which are predominantly based upon the incidental catch of indicator species above threshold levels.[126]

Nevertheless, concerns have been raised that the thresholds established by some RFMOs are contingent upon a particular volume of live by-catch. For instance, this has been the approach of NAFO, NEAFC, and SEAFO, although it is considered a poor tool to identify an encounter since the equipment used is designed exclusively to catch fish and is therefore not conducive to the effective sampling of benthic areas.[127] Similarly, given that cold water reefs (which represent a substantial proportion of current VMEs) habitually comprise a framework of primarily dead coral, significant damage may be legitimately inflicted upon a VME without triggering the 'move-on rule.'[128] There is also a risk that evidence of an encounter may be lost during the retrieval of a net, leaving otherwise responsible fishers oblivious to an impact, while a long-standing objection to 'move-on' approaches remains the tacit toleration of a documented degree of environmental harm incumbent in the process.

<H2>2. Closing Gaps in Regulatory Coverage

A further issue of strong concern within the UNGA resolutions is the need to close the significant governance gaps that were exposed by initial attempts to regulate deep-sea fisheries. Despite a significant array of RFMOs currently in existence, fisheries often remain

[125] *Deep-Sea Fishing Guidelines*, *supra* note 58, para 16.
[126] SEAFO, <Bottom Fishing Activities and Vulnerable Marine Ecosystems in the SEAFO Convention Area?> Doc CM 30/15 (<2015>); Commission for the Conservation of Atlantic Marine Living Resources (CCAMLR), <Interim Measure for Bottom Fishing Activities Subject to Conservation Measure 22-06 Encountering Potential Vulnerable Marine Ecosystems in the Convention Area> CM 22-07 (<2013>).
[127] PJ Auster et al, 'Definition and Detection of Vulnerable Marine Ecosystems on the High Seas: Problems with the "Move-On" Rule' (2011) 68 ICES Journal of Marine Science 254 at 258.
[128] *Actions Taken by States*, supra note 123, para 46.

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deceptively under-regulated on an international basis. Many such bodies apply only to single species, while, until relatively recently, large portions of ABNJ were not subject to any RFMO coverage. Moreover, as observed above, those RFMOs that did technically exercise a mandate over deep-sea stocks generally lacked the legal competence to fully protect VMEs under this purview. In this respect, closing gaps in regulatory coverage, which can objectively be viewed as one of the more successful elements of the implementation of the various UNGA commitments, has been facilitated in three main ways.

First, a suite of new RFMOs—notably SIOFA, SEAFO, the SPRFMO, and the NPFC—were inaugurated subsequent to the adoption of the initial UNGA resolutions on sustainable fisheries. Moreover, the creation of these bodies was primarily influenced by the stronger conservation mandate promoted by the UNFSA, which formally entered into effect in 2001, which has coloured their focus and remit accordingly. Indeed, some of the most recently inaugurated RFMOs have explicitly established the protection of VMEs as a central tenet of their mandates. This is most clearly illustrated by the NPFC, for which the preamble to its constituent treaty expressly references the relevant UNGA resolutions, while the prevention of significant adverse impacts from fisheries upon VMEs is established as a 'general principle' for this body.[129] Similarly, consideration of VMEs is centrally established in the mandate of the scientific institutions of the SPRFMO.[130] More significantly, perhaps, the conclusion of these instruments was preceded by a series of interim arrangements focused on the regulation of bottom fishing in these areas.

Second, the RFMOs have been prepared to interpret their mandates—and, indeed, reformulate their constituent provisions—to establish a clear degree of management control over such fisheries. This is exemplified by NEAFC, which closed three deep-sea sites to bottom trawling and fishing with static gear, including gillnets and bottom long-lines effective from 2005 onwards.[131] This was a far-sighted development at the material time, preceding the seminal UNGA Resolution 59/25 by some months, with NEAFC therefore operating in uncharted waters with no global guidance in place. Moreover, it might be questioned whether, *stricto sensu*, NEAFC possessed the requisite regulatory competence to

[129] Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean, 2012, <UNTS citation?>, preamble, art 3(e).
[130] Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean, 2009, [2012] ATS 28, art 11.
[131] Recommendation 05-2005 for the Protection of Vulnerable Deep-Water Habitats, <Doc 05-2005, 2005>.

do so, which required a very broad interpretation of the commission's powers on the part of its constituent members in approving these closures.[132]

More fundamentally, older structures have undertaken a process of considerable reform in recent years to allow them to more centrally address the environmental issues associated with deep-sea fisheries. In this respect, a series of provisions have been 'retro-fitted' into the Convention on Cooperation in the Northwest Atlantic Fisheries, through extensive textual revisions adopted in 2007 to promote an ecosystem approach to fisheries management, which eventually entered into effect on 18 May 2017.[133] Notwithstanding the recent formalization of these arrangements, many of these obligations had been applied provisionally throughout this interim period,[134] which enabled NAFO to adopt a series of measures to promote the protection of VMEs.

Individual RFMOs have also interpreted particular fishing practices in a more expansive fashion, although this remains very much the exception rather than the rule. A striking example is the approach adopted by the SPRFMO, which has defined bottom trawling as including mid-water trawling on seamounts, given the propensity for contact with seabed features even at this comparatively more elevated depth.[135] This remains a minority view, however, although similar policies were considered by NAFO in 2015, which failed to find consensus on the issue but, instead, imposed restrictions on the design and deployment of mid-water trawl gear.[136]

Third, states and entities have been prepared to undertake unilateral action in order to address locations in which no RFMO is currently operational. A particular example is the southwest Atlantic, whereby political complications preclude the likely establishment of a RFMO for these waters for the foreseeable future. Deep-sea fishing has been conducted in the region, predominantly by Spain, for which a series of voluntary closures have been instituted. In 2008, in seeking to implement the UNGA resolutions, the EU adopted a regulation specifically addressing the actions of its member states in ABNJ for which no RFMO has been established or interim measures have not yet been agreed for the protection of VMEs.[137]

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[132] Molenaar, *supra* note 43 at 538–9.
[133] Convention on Cooperation in the Northwest Atlantic Fisheries, 1978, 1135 UNTS 369, art I(h).
[134] Resolution 1/08 on the Interpretation and Implementation of the Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries (26 September 2008).
[135] *Report of the Second Scientific Committee Meeting* <SC-02 Final Report, 2014> at 15.
[136] D Diz, 'The Seamounts of the Sargasso Sea: Adequately Protected?' (2016) 31 Intl J Marine & Coastal L 359 at 366–7.
[137] EC Council Regulation No 735/2008 on the Protection of Vulnerable Marine Ecosystems in the High Seas from the Adverse Impacts of Bottom Fishing Gears, [2008] OJ L201/8.

Under this provision, such activities may only be conducted pursuant to a special permit,[138] and the use of bottom gear is prohibited in areas 'where no proper scientific assessment has been carried out and made available.'[139] A permit may only be issued upon submission of a detailed fishing plan involving an assessment of the potential impacts of fishing in the area,[140] for which any breach is considered a 'serious infringement' of the Common Fisheries Policy.[141] In response, Spain has thus far closed nine separate areas to deep-sea bottom fishing by its vessels. In 2017, a further regulation entered into force banning deep-sea fishing by EU vessels in the northeast Atlantic at depths of 800 metres, although the unilateral policies introduced by the EU for this region has generated some disquiet that such measures might exercise an undue influence over the future trajectory of the VME regulation within NEAFC.[142]

<H2>3. Area-Based Management

Allied to the need to identify areas within which VMEs may be present and to advance appropriate encounter protocols and mitigation strategies, a key commitment established within the multiple UNGA resolutions is to prevent fishing activities where they may have a significant adverse impact upon such sites. In this respect, a two-pronged approach has been adopted by RFMOs, encompassing restrictions on both current and prospective fisheries. First, RFMOs have required participants to identify their existing fishing footprints—that is, those locations in which some fishing activity has previously been conducted—with strict controls and procedures subsequently established where a state wishes to extend this footprint by conducting exploratory fishing. Second, in addition to the application of the much-maligned 'move-on' rule, such bodies have instituted fisheries closures in locations of known ecological sensitivity.

A standard feature of RFMO practice has therefore been the mapping of the current extent of fished areas with the jurisdictional waters of the body in question. For example, in 2008, NEAFC adopted an Interim Exploratory Bottom Fishing Protocol for New Bottom Fishing Areas.[143] Under these arrangements, NEAFC maintains a definitive, yet adjustable,

[138] *Ibid*, art 1(1).
[139] *Ibid*, art 6(1).
[140] *Ibid*, art 3.
[141] *Ibid*, art 10.
[142] Oanta, *supra* note 31 at 57.
[143] Recommendation XVI:2008 on Interim Exploratory Bottom Fishing Protocol for New Bottom Fishing Areas (2008).

list of existing fishing footprints. These footprints can be extended, but any activities conducted therein are classed as 'exploratory' and subject to prior approval, based on the submission of a notice of intent to fish, alongside a harvesting plan, mitigation plan, and a 'sufficient system' to record data.[144] Similar systems have been established by SEAFO,[145] the NFPC,[146] the SPRFMO,[147] and, especially, the CCAMLR,[148] on whose pioneering system of exploratory fisheries such procedures have been largely modelled.[149]

In practice, this represents a precautionary 'trade-off,' involving the approval of a highly limited degree of what is essentially research fishing under strictly controlled conditions in exchange for returning an agreed volume of data to the relevant advisory bodies of the RFMO. This process of data collection has been likened to a rudimentary version of environmental assessment.[150] As established in the UNGA resolutions, environmental assessments related to these processes are required to be made public and to consider not just the individual impact of the fishery but also its cumulative effect in tandem with other anthropogenic activities. For exploratory fisheries, most RFMOs have sought to strike a balance between scientific transparency and commercial confidentiality, publishing in effect a series of edited highlights while retaining the full documentation in-house. Nevertheless, assessment documentation can be highly variable, ranging from the extensive to the superficial.[151] Likewise, concerns have been raised that assessments of cumulative impacts have been generally marginalized, notwithstanding more comprehensive submissions to the SPRFMO and the CCAMLR.[152] This has, however, been an enduring problem even for well-managed exploratory fisheries, where fishers have focused on gathering data on the target stock rather than on the wider marine ecosystem.[153]

[144] Recommendation 19:2014 <Protection of VMEs in NEAFC Regulatory Areas, as Amended by Recommendation 09:2015 and Recommendation 10:2018> (2014) arts 6, 7.
[145] SEAFO, *supra* note 127.
[146] *Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the Northeast Pacific Ocean*, Doc CMM 2016-05 (2016): *Bottom Fisheries and Protection of Vulnerable Marine Ecosystems in the North-western Pacific Ocean*, Doc CMM 2016-06 (2016).
[147] *Management of Bottom Fishing in the SPRFMO Convention Area*, Doc CMM 03-2014 (2014).
[148] *Bottom Fishing in the Convention Area*, Doc CM 22-06 (<2017>).
[149] See Caddell, *supra* note 78 at 215–24.
[150] G Sander, 'International Legal Obligations for Environmental Impact Assessment and Strategic Environmental Assessment in the Arctic Ocean' (2016) 31 Intl J Marine & Coastal L 88 at 105–6.
[151] See the limited documentation submitted to the South Pacific Regional Fisheries Management Organization by the European Union, compared with the extensive submissions of Australia and New Zealand. See <https://www.sprfmo.int/conservation-measures/benthic-impact-assessments/>.
[152] *Actions Taken by States*, supra note 123, para 158.
[153] CCAMLR, *Report of the Thirty-Fourth Meeting of the Commission*, Doc CCAMLR-XXXIV (<2015>), para 9.19.

The second main strategy has been the designation of restricted areas for bottom fishing. In this respect, a significant volume of area closures have been instituted by NEAFC, NAFO, SEAFO, and the CCAMLR. Moreover, the GFCM has established three separate fisheries restricted areas for a more modest volume of territory—representative of the rather abbreviated pockets of ABNJ in these waters—but has also imposed a long-standing prohibition on bottom trawling in any area below 1,000 metres.[154] Formal closures have not yet been instituted by the most recently created RFMOs—the SPRFMO and the NPFC—although this consideration of VMEs, including the prospective designation of geographical restrictions, remain a significant operational priority. Meanwhile, perhaps most intriguingly, a series of benthic protected areas (BPAs) have been established within the Southern Indian Ocean. While SIOFA has not yet implemented formal area closures, a mosaic of thirteen voluntary BPAs have been instituted by the Southern Indian Ocean Deep-Sea Fisheries Association (SIODFA) with respect to the five leading companies operating in these waters.

<H1>V. CHALLENGES OF FUTURE INTEGRATION

In recent years, the need to promote greater practical and institutional cohesion in discharging the mandates of multilateral regimes has become a significant priority for IEG. As the number of treaties and institutions exercising competence over components of the global environment has steadily proliferated, and new regulatory practices have become the norm for IEG,[155] legal and logistical challenges have been encountered in consolidating and coordinating conservation strategies and priorities.[156] Thus far, the complications associated with the increasing fragmentation of IEG have been primarily explored by pursuing strategic alignments and coordinated working partnerships between treaties with a clear degree of commonality between their respective mandates.[157] Given the emphasis upon institutional symbiosis within the ILBI, future arrangements for ABNJ are poised to follow this broad trend.

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[154] <Recommendation on the Management of Certain Fisheries Exploiting Demersal and Deep-Water Species and the Establishment of a Fisheries Restricted Area below 1000m>Doc REC29/2005/1 (2005).
[155] RR Churchill and G Ulfstein, 'Autonomous Institutional Arrangements in Multilateral Environmental Agreements: A Little-Noticed Phenomenon in International Law' (2000) 94 AJIL 623.
[156] See further R Caddell, 'The Integration of Multilateral Environmental Agreements: Lessons from the Biodiversity-Related Conventions' (2012) 22 YIEL 37 at 58–69; BH Desai, *Multilateral Environmental Agreements: Legal Status of the Secretariats* (2010) at 101–69.
[157] KN Scott, 'International Environmental Governance: Managing Fragmentation through Institutional Connection' (2011) 6 Melbourne J Intl L 177 at 184–8.

Nevertheless, policy actions concerning ABNJ have been generally developed by individual actors operating largely in isolation to each other, focusing on a particular sectoral challenges, such as the management of specific fishing activities, the prospective extraction of submarine mineral resources, or the regulation of certain shipping practices. Thus, as David Freestone observes, '[e]ach of these approaches has value, but each is developed and assessed by its own epistemic community; it is not developed with any reference to the work of other sectoral bodies.'[158] Similarly, there has been little tradition of integrative practices between fisheries and environmental regulators at the regional and global levels, a trend that is also widely replicated on a domestic basis.[159] Hence, in the present context, the underlying philosophy of the prospective ILBI represents a different challenge for IEG—namely, to foster effective methodologies to harness these sectoral approaches in a manner that benefits the management of ABNJ more holistically than has occurred in the past.

The protection of VMEs therefore provides an intriguing context by which to consider the relationship between sectoral regulators and international and regional governance regimes. As noted above, in facilitating the objectives of the pertinent UNGA resolutions, a mosaic of areas closed to deep-sea bottom fishing has been established across an increasing number of locations in ABNJ. RFMOs, however, are not the only sectoral regulators with the capacity to restrict particular activities in designated places within ABNJ. The International Maritime Organization (IMO), through its Particularly Sensitive Sea Area (PSSA) concept, may identify locations that require special attention due to their inherent ecological, socio-economic, or scientific attributes and could be adversely affected by the impacts of shipping. Moreover, the IMO considers that PSSAs are most appropriately established in areas for which there is a degree of pre-existing environmental protection, [160] thereby providing further impetus to develop a more cohesive relationship with protected areas established by other actors. As yet, no such areas have been identified within ABNJ, although the global legitimacy of the IMO would provide a clear regulatory basis to do so in the future.[161] Similarly, the International Seabed Authority (ISA) (which, by definition, operates solely in

[158] D Freestone, 'Governance of Areas beyond National Jurisdiction: An Unfinished Agenda?' in J Barrett and R Barnes, eds, *Law of the Sea: UNCLOS as a Living Instrument* (2016) 231 at 264.
[159] R Rayfuse and R Warner, 'Securing a Sustainable Future for the Oceans beyond National Jurisdiction: The Legal Basis for an Integrated Cross-Sectoral Regime for High Seas Governance for the Twenty-first Century' (2008) 23 Intl J Marine & Coastal L 339 at 402–3.
[160] B Sage-Fuller, *The Precautionary Principle in Marine Environmental Law with Special Reference to High Risk Vessels* (2013) at 233.
[161] J Roberts, A Chircop and S Prior, 'Area-Based Management on the High Seas: The Application of the IMO's Particularly Sensitive Sea Area Concept' (2010) 25 Intl J Marine & Coastal L 483 at 501; see also Churchill, *supra* note 66 at 70–5.

ABNJ) may preclude seabed mining for certain locations and establish MPA-like protected areas, with a series of areas of particular environmental interest having been deployed throughout the Clarion-Clipperton Zone.[162] As with the area closures adopted by RFMOs to protect VMEs, any sectoral restrictions instituted by the IMO or ISA apply solely to the particular activity in question. Thus, while they provide protection to a marine area, they are not MPAs. Conversely, other regional regulators (notably the array of regional seas agreements) have some capacity to establish MPAs, but they are generally divested of the competence to regulate specific sectoral activities in these locations.[163] Therefore, in the context of the ILBI, there is strong encouragement for areas subject to sectoral restrictions to be more closely integrated with other forms of protected areas, such as those developed by regional institutions, and, indeed, the initiatives of other sectoral regulators.[164]

This process remains at a nascent stage, although tentative connections have emerged within particular regions, which suggests that integrative practices can be developed to some degree for VMEs in ABNJ through partnerships between pre-existing regimes. The most prominent example is the pioneering relationship between the OSPAR Commission and NEAFC, whose respective jurisdictional purviews overlap within the northeast Atlantic region and include a significant portion of ABNJ. As noted above, NEAFC has long been preoccupied with the environmental impacts of deep-sea fishing, although its legal mandate remains confined to fisheries management. Meanwhile, since 1998, with the adoption of a new Annex V to the OSPAR Convention, the OSPAR Commission has extended its purview to include 'non-polluting human activities' that can adversely affect marine ecosystems, although this strictly excludes any consideration of fisheries or shipping,[165] for which the Commission's responsibilities are limited to bringing such issues to the attention of other bodies with the requisite legal competence. In discharging this mandate, the OSPAR Commission has placed considerable emphasis upon establishing a network of protected areas, particularly in ABNJ, and has a comparatively lengthy history of promoting

[162] See A Jaeckel, 'An Environmental Management Strategy for the International Seabed Authority? The Legal Basis' (2015) 30 Intl J Marine & Coastal L 93 at 106–9.
[163] The notable exception is the CCAMLR, whose unique mandate allows for the institution of MPAs as well as fisheries closures in ABNJ within its purview. Additionally, it has regulated sectoral activities within other classifications of areas that are protected, but are not formal MPAs, such as the recently developed concept of 'newly exposed marine areas' generated by the collapse of significant sections of the Larsen ice shelf.
[164] *Report of the Ad Hoc Open-Ended Informal Working Group to Study Issues Relating to the Conservation and Sustainable Use of Marine Biological Diversity beyond Areas of National Jurisdiction; Co-Chairpersons' Summary of Discussions*, UN Doc A/61/65 (<2006>), para 58.
[165] OSPAR Convention, *supra* note 64, art 4, Annex V.

interactions with other organizations in this capacity.[166] With both organizations sharing a mutual interest in the protection of deep-water ecosystems and each holding different pieces of the jurisdictional jigsaw, there is clear scope for the OSPAR Commission and NEAFC to work collaboratively towards the further protection of deep-sea VMEs in this region.

In 2008, a memorandum of understanding (MOU) was concluded between NEAFC and the OSPAR Commission to explore areas of mutual interest and formalize a basis for potential future collaboration.[167] The MOU is a concise document emphasizing the complementary, but individual, mandates of both organizations. Nevertheless, a series of potential interactions were outlined, including cooperation over human activities, marine spatial planning, area management, and scientific assessment. Thus far, the most significant outcome of these interactions has been the conclusion in 2014 of a collective arrangement on cooperation on marine protected areas in ABNJ.[168] In 2009, NEAFC had closed a series of areas to bottom fishing that broadly corresponded to the designations within the OSPAR MPA network, notably within the Charlie Gibbs and Mid-Atlantic Ridge MPAs. The collective arrangement therefore addresses particular locations of mutual interest within the region, which are outlined in Annex I and are jointly maintained by both organizations. While not exclusively focused on VMEs or, indeed, the deep-sea environment—though promising lines of cooperation have also emerged for marine litter and shark conservation—the collective arrangement provides a platform for data exchange and updates on amendments to the respective restricted areas, with annual meetings having been convened since 2015 to promote these objectives further.

The OSPAR/NEAFC arrangements illustrate both the opportunities and the challenges facing the prospective ILBI in facilitating collaborative exchanges of this nature. Significantly, the collective arrangement is not intended to operate bilaterally and seeks to incorporate additional actors, since the Annex I areas could also be compromised by other sectoral activities, notably seabed mining or shipping, which are regulated in isolation to these considerations. The OSPAR Commission and NEAFC have therefore encouraged the IMO and ISA to join this process, albeit with little success. Attempts to court the IMO have

[166] EJ Molenaar and AG Oude Elferink, 'Marine Protected Areas in Areas beyond National Jurisdiction: The Pioneering Efforts under the OSPAR Convention' (2009) 5 Utrecht L Rev 5 at 16.
[167] Memorandum of Understanding between the North East Atlantic Fisheries Commission and the OSPAR Commission (2008), <http://www.ospar.org/about/international-cooperation/memoranda-of-understanding>.
[168] Collective Arrangement between Competent International Organisations on Cooperation and Coordination regarding Selected Areas in Areas beyond National Jurisdiction in the North-East Atlantic, OSPAR Agreement 2014-09 (2015). See further NEAFC/OSPAR, *Information Paper on the Process of Forming a Cooperative Mechanism between NEAFC and OSPAR from the First Contact to a Formal Collective Arrangement*, https://www.ospar.org/about/international-cooperation/collective-arrangement

been stymied by incompatible meeting schedules[169] and, more ominously, opposition from IMO participants disinterested in the region.[170] Meanwhile, the ISA has maintained informal contact with the collective arrangement but has also faced internal scepticism from participants favouring a clearly defined project-based role over the more philosophical virtues of open-ended institutional interaction.[171] Moreover, concerns have been raised within the OSPAR Commission that promoting cross-sectoral management ultimately constitutes just one aspect of an extensive portfolio of activities that it is unable to prioritize without compromising the implementation of its wider mandate.[172]

Tellingly, however, few parallel initiatives have emerged in other regions. Indeed, the regulatory conditions that have proved conducive to such synergies in the northeast Atlantic—namely, two bodies with complementary legal and geographical competences, accompanied by sufficient financial and political capital—are not necessarily replicated across the full cohort of regions in which RFMOs have addressed policies towards VMEs. Thus far, such institutional synergies have only been progressed (and to a rather more modest degree) within the Mediterranean region. In this regard, the GFCM has sought to promote a greater degree of coherence with the network of specially protected areas of Mediterranean importance established under the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean.[173] However, this has not as yet yielded integrated management policies specifically for VMEs in the region. Instead, these initiatives have primarily focused on addressing by-catches of marine mammals in the Mediterranean, although this suggests that the institutional treatment of VMEs can also have beneficial side-effects for marine conservation problems in ABNJ that are unconnected with vulnerable deep-sea ecosystems.

<H1>VI. CONCLUSION

[169] *Aide Memoire and Key Actions Resulting from the First Meeting under the Collective Arrangement*, <2015> para 2.7.
[170] *Aide Memoire and Key Actions Resulting from the Second Meeting under the Collective Arrangement*, <2016> para 3.6.
[171] Accordingly, the formal participation of the ISA is considered 'premature.' *Ibid*, para 3.6.
[172] D. Freestone et al., 'Can Existing Institutions Protect Biodiversity in Areas beyond National Jurisdiction? Experiences from Two On-Going Processes' (2014) 49 Marine Policy 167 at 173.
[173] Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, 1976, 1242 UNTS 174. See Resolution GFCM/37/2013/1 on Area Based Management of Fisheries, Including through the Establishment of Fisheries Restricted Areas (FRAs) in the GFCM Convention Area and Coordination with the UNEP-MAP Initiatives on the Establishment of SPAMIs (<2013>).

The ‘uninvaded sleep’ of the denizens of the deep-water ecosystems imagined by Alfred Tennyson has become increasingly illusory in recent years as anthropogenic activities have steadily proliferated in the marine environment. One of the most troubling manifestations of this trend has been the poorly regulated expansion of fisheries into the deep seas in ABNJ, which has had a devastating impact upon particular ecosystems and fish stocks. Deep-sea stocks and ecosystems represent a significant challenge for the purported precautionary management of marine resources, with their exploitation conducted in a context of strikingly limited baseline information as to the resilience of such areas and species to prospective fishing. This has been compounded by alarming governance gaps exposed by the pursuit of deep-sea fishing in ABNJ, notably a lack of effective and competent institutions, an accompanying failure of coordinated regional and global regulation, and a significant volume of illegal and unregulated activity.

More optimistically, since the turn of the present century, there has been a concerted international effort to address these governance failings and to develop a clear and coordinated response to the challenges raised by the pursuit of vulnerable deep-sea fish stocks and the resultant impacts upon the fragile ecosystems in which they are located. To this end, a suite of commitments has been developed incrementally through the UNGA to be implemented primarily through a growing number of RFMOs exercising competences over the high seas, for which encouraging progress has occurred towards the further development of a coherent and effective regulatory framework for these unique ecosystems.

Most tangibly, the volume of RFMO coverage has increased dramatically over the past decade, steadily filling a regulatory vacuum for ABNJ with a series of tessellating regimes exercising a more extensive set of competences over fish stocks and marine ecosystems. While this process was initiated primarily through the adoption of the UNFSA, the impact of the UNGA VME resolutions should not be understated as a regulatory catalyst. This has facilitated a series of unilateral innovations, not only by the EU in areas presenting particular governance challenges but also by elements of the fishing industry itself. In this way, the UNGA commitments can be viewed with increasing confidence as representing a set of recognized minimum standards for fishing activities in ABNJ, as evidenced by their prominent consideration in the development of new arrangements for the high seas. The closure of governance gaps has been accompanied by the elaboration of effective standards for the growing volume of exploratory fishing conducted in VMEs as well as an increasing number of area closures in regions of particular ecological sensitivity.

Nevertheless, considerable challenges remain, not only in the specific regulatory context of the deep-sea environment but also for the prospective governance of marine biodiversity in ABNJ more holistically. The UNGA commitments remain far from fulfilled on a global basis, notwithstanding laudable examples of good regional practices. Concerns remain over the effectiveness of encounter protocols, for which the operational thresholds have exhibited flaws, and a reliance upon 'move-on' rules has proved at best to be an inefficient mitigation strategy. Accordingly, a significant volume of fishing may be legitimately conducted in areas of acute ecological sensitivity—or, perhaps more accurately, in areas in which there is insufficient data to gauge the full implications of such activities upon VMEs—while current fisheries footprints remain large (wherein lesser restrictions are imposed upon prospective fishing), and a number of RFMOs have yet to initiate area closures for large swathes of the global oceans. The success of encounter protocols is contingent upon the exhaustive mapping of enormous areas of the global seabed, a forbidding task in practice given the financial and logistical implications of conducting such activities in remote, hostile, and extreme environments. In the meantime, an uneasy compromise between continued fishing and a reliance upon the limited scientific data currently and prospectively available constitutes the most practical application of precautionary fisheries management in this context.

Ultimately, while the coalescence of international standards for the regulation of deep-sea bottom fisheries represents an intriguing contemporary case study of the governance of marine ecosystems located in ABNJ, it is also suggestive of wider lessons for the operation of the nascent ILBI. With its stated philosophy to work symbiotically with existing structures and processes, yet 'not undermine' these regimes, the ILBI faces considerable practical challenges in aligning holistic conservation strategies for marine biodiversity in ABNJ. The experience thus far of promoting developing strategic alignments between sectoral initiatives and regional environmental regulators suggests that such synergies may yield qualified successes. The northeast Atlantic context demonstrates that fisheries closures can dovetail effectively with MPAs within ABNJ and present clear opportunities to exchange valuable data, promote technical collaboration, and facilitate a more coherent form of area-based management. Conversely, it reveals a marked reluctance on the part of global regulators—whose mandates are exercised in conjunction with interests far removed from the locus of regional activities—to actively participate in the process, alongside internal pressures to recognize that collaborative initiatives for ABNJ represent a significant, but small, element of the suite of responsibilities exercised by sectoral and regional bodies. While the emerging

ILBI may have much to commend it, not least in its commitment to bolstering the oversight of evolving regulatory problems for which the UNCLOS framework has proved to be inadequate and dated, the pursuit of its ambitions towards facilitating a more streamlined approach to the international governance of the marine environment in ABNJ may ultimately prove to be rather more circumspect.